

UNITED STATES DEPARTMENT OF AGRICULTURE
Agricultural Research Administration
Office of Administrator

ORGANIZATION OF AGRICULTURAL RESEARCH IN THE UNITED STATES

Questions and Answers

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Agricultural research in the United States has had a long and distinguished history. Beginning in an organized way with the establishment of the United States Department of Agriculture in 1862, it has developed through the years until today the State agricultural experiment stations and the Federal Department of Agriculture together constitute a large cooperative agricultural research organization, with a program designed to deal with problems of local, State, regional, and national significance.

Foreign visitors to the Department of Agriculture usually ask many questions about the organization of agricultural research in the United States. In the following pages an attempt has been made to state some of these questions and answer them, so that visitors may have the information in written form for reference purposes.

This publication describes only that research which is conducted by the United States Department of Agriculture and the State agricultural experiment stations. The visitor should remember, however, that information of interest to the agricultural research worker comes from many other agencies. For example, many privately financed organizations conduct research in agriculture and homemaking. The United States Department of Interior conducts studies in such fields as reclamation and irrigation, fish and wildlife, and range management. The Bureau of the Census in the U. S. Department of Commerce, through its Census of Agriculture every 5 years, collects a great many statistics which are tools for agricultural research workers.

Some of the State governments have departments of agriculture or comparable departments that are conducting research in limited fields of agriculture.

1. How is agricultural research financed in the United States?

Federal research is financed by funds appropriated annually by the United States Congress. The U. S. Department of Agriculture was established by an act of Congress in 1862. The Hatch Act of 1887 provided for the establishment of an agricultural experiment station in connection with the land-grant college in each State and Territory and authorized an annual Federal grant of funds for the partial support of these stations. Through the years the Adams, Purnell, Bankhead-Jones, Research and Marketing Acts, and certain supplementary acts have successively provided funds for increasing the scope of agricultural research, at both the State and the Federal level, to meet the growing needs of American farmers in a rapidly expanding economy. The State legislatures, also, have encouraged and supported research by consistently appropriating funds for the solution of agricultural problems within their respective States.

Federal appropriations for agricultural research during the fiscal year 1950 approximated \$59,000,000, of which \$47,000,000 was allotted to Department agencies and \$12,000,000 was made available to State agricultural experiment stations as Federal grant funds. The States themselves provided more than \$40,000,000, which averages about \$3.50 for each \$1 received from Federal grants. These Federal and State appropriations total about \$100,000,000 in public funds spent last year on agricultural research.

In some cases, projects in which the Department is engaged are financed in part by allotments of funds from other Federal agencies or by funds made available by private cooperators. An example of Federal agency cooperation is development of insect repellents with funds made available by the defense agencies. Most of the research bureaus cooperate with organizations of producers in their respective fields. In only a few cases does the cooperator actually turn over money to the Department; usually the cooperator and the Department use their own funds in conducting a program under a joint memorandum of understanding.

2. How many Federal and State agricultural experiment stations are there in the United States?

The Department of Agriculture carries on research at more than 400 field locations in the United States. These locations include Federal field stations, Federal laboratories, and cooperative work at State experiment stations. They do not include private agencies conducting research under contract with the Department of Agriculture. The Department also carries on research in about 30 foreign countries.

The States and Territories maintain approximately 325 research centers comprising the main station and varying numbers of substations or field laboratories in each.

3. How many scientific people are employed in research by the U. S. Department of Agriculture? By the States?

The Federal Department has approximately 4,100 scientists engaged in research. The States have about 5,900 scientific personnel, of which 2,900 are employed full time on research and 3,000 divide their time into research, extension, and teaching. Both the Department and the States employ many other persons in work related to research, such as subprofessional people, typists, stenographers, and statistical clerks.

4. How is agricultural research organized in the U. S. Department of Agriculture and the States?

The U. S. Department of Agriculture is organized into agencies or bureaus, all of which are under the general direction of the Secretary of Agriculture, who is an officer in the cabinet of the President of the United States.

The Agricultural Research Administration is the primary agency of the U. S. Department of Agriculture engaged in research in the physical and biological sciences. It comprises several bureaus engaged in research in such fields as animal industry, plant industry, soils, agricultural engineering, human nutrition, home economics, dairy industry, entomology, plant diseases, and agricultural and industrial chemistry. These will be discussed in more detail further on.

The Bureau of Agricultural Economics is the primary economic research and statistical agency of the U. S. Department of Agriculture. Its work, too, will be discussed further on.

In addition, there are several other agencies of the Department of Agriculture whose primary function is in other fields such as staff or program work, but which also conduct some research in the fields of either physical science or social science, or both.

The agricultural experiment stations in the States and Territories conduct research in physical and biological sciences and economic and social sciences. Each station has a director, responsible for the coordination of research within his station, and it is attached to a land-grant college or university.

5. What is the relationship between the U. S. Department of Agriculture and the State agricultural experiment stations? Do State experiment stations have a role in the programs of the Department's regional laboratories? Of other Department field stations?

The Department of Agriculture carries on extensive cooperation with the State agricultural experiment stations. These State stations are responsible to the people of their respective States. They maintain close contact with their people and are in a position at all times to recognize and study the needs of agricultural producers, marketing agencies, and consumers. Some problems of regional significance are studied cooperatively by two or more States, often in cooperation with one or more Federal bureaus.

Although the State agricultural experiment stations are State bodies under State control and supported largely by State funds, they also receive financial support from the Federal Government. These Federal grant funds are administered by the Office of Experiment Stations, one of the agencies of the Agricultural Research Administration.

Frequently both the U. S. Department of Agriculture and a State agricultural experiment station are interested in solving a particular problem. Usually the Department is concerned because of broad regional or national interests; the State station is interested because of demands by farmers within the State. In such cases--and there are hundreds of them--representatives of the two agencies meet and decide on what portion of the total research job each will undertake. On the basis of these discussions, a formal document is prepared and signed by both parties. Several bureaus of the Department and any number of State agricultural experiment stations may join in a single cooperative undertaking to solve a problem of such scope that it extends over a considerable portion of the country or into more than one subject-matter field of agricultural science.

An example of how the Department and the State stations work together is the hybrid corn breeding program. The earliest work done on hybrid corn was in State experiment stations. In 1925 corn breeders in 12 States and the Department decided to combine their efforts so that each State could reap the benefits of work done in other States. This program has made possible the fullest use of all information on hybrid corn. The phenomenal spread of hybrid corn in the United States is largely a result of the cooperative research program.

Another example of a large-scale cooperative undertaking is the regional research laboratories established under the Bankhead-Jones Act of 1935, which provided for regional laboratories, to be administered by the Secretary of Agriculture, which would mobilize scientific resources for a fundamental attack on some of the more important regional problems. Nine such laboratories have been established. They are placed administratively under the Agricultural Research Administration bureaus covering their subject matter. Each laboratory deals with a problem or group of problems selected in cooperation with the State agricultural experiment stations of the region concerned. In addition to a special leader for the program, there is a group of collaborators from the State and Federal agencies who act as a scientific advisory board for the project. This board usually meets at least once a year to review progress and to make additional or revised plans for the following year's work. Although the research program of each laboratory is carried out on a regional basis, the subjects under investigation often are important to all major agricultural regions, and the results obtained by the laboratories contribute to agriculture throughout the Nation. The Bankhead-Jones laboratories and their locations are as follows:

- Vegetable Breeding Laboratory, Charleston, South Carolina
- Pasture Research Laboratory, State College, Pennsylvania
- Soybean Laboratory, Urbana, Illinois
- Swine Breeding Laboratory, Ames, Iowa
- Sheep Breeding Laboratory, Dubois, Idaho
- Animal Disease Laboratory, Auburn, Alabama
- Poultry Research Laboratory, East Lansing, Michigan
- Salinity Laboratory, Riverside, California
- Plant, Soil, and Nutrition Laboratory, Ithaca, New York

The four Regional Research Laboratories of the Bureau of Agricultural and Industrial Chemistry are operated on a somewhat different basis. They are Federal establishments located in the four principal regions of the country for the purpose of finding new uses for the commodities of each region. They may or may not have formal cooperative agreements with the State experiment stations. However, each laboratory does have an Agricultural Experiment Stations Relations Committee, composed of the directors of the experiment stations in the region and the director of the laboratory, which meets each year to review the work at the laboratory and to discuss matters of policy. Also, periodic meetings are held at the laboratory for technical representatives of the State experiment stations. These meetings permit informal exchange of views and technical information between the regional laboratory and the experiment station personnel.

Most of the research at Federal field stations is in cooperation with State experiment stations, sometimes with only the station in the State where the Federal station is located, sometimes with other stations in neighboring States that have an interest in the problem.

To understand the relationship between the State experiment stations and the Federal Department of Agriculture, it is necessary to remember that this Nation was formed by independent States. The compromise between a strong central government and a strong local government has worked very well through the years. The pattern of our research organization is merely a reflection of our political organization. This pattern of cooperation has been developed voluntarily over the last 60 years. In our cooperation with the State stations, we recognize the responsibility of each agency as an integral part of administration. We respect the autonomy of the States and their institutions. Insofar as possible, all points where differences might arise are covered by written agreements. These may cover financial contributions by each party, facilities, personnel, and similar matters.

6. What steps are taken to coordinate research or avoid duplication of research at the various Federal laboratories and field stations and State agricultural experiment stations?

All research in the U. S. Department of Agriculture, other than economic, is approved and coordinated in the Office of the Administrator of the Agricultural Research Administration. The Chief of the Bureau of Agricultural Economics coordinates economic and statistical research. A central inventory of all Department research projects is maintained in the Office of the ARA Administrator. This inventory contains copies of all project statements with brief descriptions of the work to be done and the objectives. This Central Project Office is used jointly by the Administrator and the Chief of the Bureau of Agricultural Economics in performing their coordinating functions.

State station research, financed by Federal grant funds, is initiated by the stations themselves and approved by the Office of Experiment Stations as to conformity with the provisions of the grant acts through the medium of submission of copies of proposed research line projects to that Office for review. That Office, through reference to the comprehensive record of State station research which it maintains and to the Department's central project files, is enabled to effect desirable coordination of research effort when new research is proposed. State experiment stations in the

regions where the Bankhead-Jones Regional Laboratories are located normally develop regional technical committees, which work closely with the director of the laboratory on the development of research in the field of science covered by the laboratory.

In addition to these rather formal procedures for coordinating and avoiding duplication of research, there are many other ways of acquainting scientists with work going on elsewhere in their special fields. These include national meetings of scientific societies, scientific literature, annual reports, and correspondence between scientists in similar fields of work.

7. Who may propose research work for the U. S. Department of Agriculture and the States? How are priorities established? Who finally determines which projects are selected?

Most of the research in the U. S. Department of Agriculture, both fundamental and applied, originates in problems faced by the people of the United States. Some of these problems are of an emergency nature, such as an animal disease outbreak or a crop insect infestation. Others are not of an immediate emergency nature but are important for the welfare of large groups of people and for the economy of our country. Examples of this type of research are studies on the composition of milk or cotton or the improved breeding of livestock. Even such basic research as that on composition of cotton is directly related to the problems of the cotton grower, the processor, and the marketing organizations, as well as the consuming public. Problems which finally become research projects in the Department may come from individual farmers, cooperatives of farmers, processors, or marketing agencies, industry committees, or other civic groups. The problems may reach the Department directly or through its field employees, commodity and functional advisory committees established under the Research and Marketing Act, State agricultural colleges, press and radio farm directors, or members of the United States Congress.

Research projects that require additional money are included in the bureau's proposed budget, which, after passing through administrative review in the Department and the Budget Bureau, is presented to Congress for appropriation of funds. The Congress usually appropriates funds for broad lines of work, such as research on insects. The individual lines of research are determined by the bureau or agency proposing to do the work and are approved by the ARA Administrator or the Chief of BAE, on the basis of their relation to other research in the Department and at the State experiment stations, on their likelihood of producing results, and in terms of their scientific merit.

State experiment station research originates in much the same way as does Federal research. Major problems encountered by farmers, rural communities, and local processing or marketing agencies are brought to the experiment station. The station director, in consultation with his technical and scientific staff, determines priority. Station projects may be carried on under State funds, private endowments, or Federal grant funds. All Federal grant fund projects are reviewed and approved by the Federal Office of Experiment Stations, as required by Federal law governing use of such funds.

8. What is the Agricultural Research Administration? How is it organized? What are the functions of its constituent bureaus? Do they cooperate on research problems or is each operated independently?

The Agricultural Research Administration was established in 1942 to consolidate most of the physical, biological, chemical, and engineering research in the Department. It is headed by an Administrator, who is responsible for the direction and integration of its activities. In addition to the direct administration of the work of the research bureaus grouped into the ARA, the Research Administrator coordinates the research of other large units of the Department such as the Forest Service and the Soil Conservation Service, although the administrative functions are carried on under each respective agency. He also administers the Research and Marketing Act of 1946, which provides for a greatly expanded program of agricultural research and services in which the U. S. Department of Agriculture, State experiment stations, extension services, and departments of agriculture, and other public and private agencies cooperate. Most of the agencies in the Department are carrying on research or service work under this act.

Within the ARA, the bureaus function independently of one another from an administrative standpoint. All research projects, however, are coordinated and approved in the Office of the Administrator. Research which falls within the scope of two or more bureaus is usually carried on cooperatively by the bureaus concerned. For example, research on developing insecticides for controlling insects of forage crops would include the Bureau of Entomology and Plant Quarantine for the insecticide research, the Bureau of Plant Industry, Soils, and Agricultural Engineering for the study of effects on the forage plants, and the Bureaus of Animal Industry and Dairy Industry for the effects on the livestock fed the forage.

The ARA comprises six bureaus and the Office of Experiment Stations. They are Agricultural and Industrial Chemistry; Animal Industry; Dairy Industry; Entomology and Plant Quarantine; Human Nutrition and Home Economics; and Plant Industry, Soils, and Agricultural Engineering.

The Office of Experiment Stations does not conduct research itself, but administers the Federal grant funds appropriated under the various acts of Congress for the partial support of the State agricultural experiment stations. This Office is held responsible for ascertaining that expenditures of Federal grants to the State experiment stations are used for purposes within the statutory authorizations. It coordinates the research among the States within the lines authorized in said acts, and takes an active part in the planning and coordination of cooperative regional research among the State stations. It directs the Federal Experiment Station at Mayaguez, Puerto Rico. The Chief of the Office of Experiment Stations is also Assistant Administrator for States Relations, Agricultural Research Administration.

The Bureau of Agricultural and Industrial Chemistry conducts research to develop new and improved products from agricultural commodities, to find better commercial methods for preserving foods, and to increase the use of farm crops and byproducts as industrial raw materials. Most of the bureau's research is done in its four Regional Research Laboratories--each working on the major crops of its region. The bureau also maintains nine smaller field stations engaged in research on fruit and vegetable products, pickling

and fermentation, sugarcane processing, production of rosin, turpentine, and naval stores derivatives, domestic natural rubber, and tung oil. Eight special divisions, located in the Regional Laboratories and at the Agricultural Research Center, are doing research in the fields of allergens, biochemistry, carbohydrate chemistry, enzymes, microbiology, naval stores, pharmacology, and synthetic liquid fuels.

The Northern Laboratory, located at Peoria, Illinois, is working with corn, wheat, and other cereal crops, soybeans and other oilseed crops, and agricultural residues. The Southern Laboratory, at New Orleans, Louisiana, is working with cotton, sweetpotatoes, rice, and peanuts and other oilseed crops of the southern region. The Western Laboratory at Albany, California, is working with alfalfa, wheat, fruits, vegetables, white potatoes, wool and wool grease, poultry products and byproducts, and rice. The Eastern Laboratory at Philadelphia, Pennsylvania, is working with apples, vegetables, tobacco, milk products, maple products, honey, animal fats and oils, white potatoes, and tanning materials, hides, and skins.

The Bureau of Animal Industry is concerned with the eradication and control of livestock diseases and parasites, development of better livestock through improved breeding and management, inspection of import and export livestock and sanitary control of import animal products, and administration of the Federal Meat Inspection Act. Among the bureau's control and eradication programs, those concerned with tuberculosis, brucellosis, and foot-and-mouth disease are probably best known. Its research program includes breeding, feeding, and management of livestock, poultry, and fur animals to improve the quality and usefulness of their products; and investigations into the nature, causes, and pathology of infectious, noninfectious, and parasitic diseases of these animals, to develop improved diagnostic, vaccinal, and other methods for prevention and control. The bureau also supervises national plans for improving the production and breeding qualities of chickens and turkeys and reducing their mortality.

The Bureau of Dairy Industry conducts research in the breeding, feeding, nutrition, and management of dairy cattle, and in the physiology of milk secretion and of reproduction, with a view to developing more efficient dairy herds. It also conducts research on dairy products and byproducts not only to improve and find new uses for them but to develop new milk products. Because of the varied and complex nature of milk and milk products, the research involves studies in organic, physical, and biological chemistry, in the microbiology of bacteria, yeasts, and molds, and in the technology of food products.

The Bureau of Entomology and Plant Quarantine studies insects with a view to developing practical methods for destroying the harmful ones and promoting the increase and spread of the beneficial ones, including honeybees. It also cooperates with State and local agencies in programs to control insect pests and plant diseases which occur in outbreaks or which have become established in limited areas. Among the best known are those relating to grasshoppers, gypsy moth, Japanese beetle, and white-pine blister rust. Its insecticide research includes the development of new insecticides and improved methods and equipment for their application. The bureau conducts research in foreign countries to locate natural enemies of insect pests that occur in the United States and imports desirable species. It is

responsible for enforcing Federal plant quarantines and regulatory orders to prevent the introduction into the United States of injurious insect pests or plant diseases. It also cooperates with States in enforcing quarantines to prevent the spread of pests such as the Japanese beetle and white-fringed beetle, which are established in limited areas. It inspects and certifies, as to freedom from injurious pests and diseases, plants and plant products that are intended for export.

The Bureau of Human Nutrition and Home Economics conducts both laboratory and field investigations to provide basic scientific information concerning food and nutrition, textiles and clothing, housing and household equipment, and family economics. It also coordinates the nutrition services available to the public through programs of Federal, State, and other agencies. Its food and nutrition research includes the determination of the nutritive requirements of people, the composition and nutritive value of food to meet these needs; the best use of agricultural products, including food selection; care of food in the home, and the most suitable methods of food preparation and preservation. Research in textiles and clothing emphasizes studies to assist homemakers with the selection, use, and care of family clothing and to help producers in the development of fibers, fabrics, and garments for specific consumer uses.

Housing and household equipment is studied to obtain information as a basis for the improvement of functional design of rural houses for comfortable living and efficient work. Determinations are made of specific requirements for effectively carrying out specific household activities to aid construction planning and develop better facilities for homemakers. The operating characteristics and performance and use of household equipment are studied in order to assist families with the selection, use, and care of household equipment. In the field of family economics, efforts are made to learn to what extent major needs of families for goods and services are met and what factors are influencing consumption. This includes the collection, interpretation, and dissemination of facts regarding income, savings, expenditures, home production activities, and consumption of families as needed in programs for improving living levels.

The Bureau of Plant Industry, Soils, and Agricultural Engineering does research on crop, soil, machinery, storage, transportation, and housing problems of general and specialized farming, forestry, and gardening. Among the problems studied are those of weather, disease, weeds, fertilization, mechanical operations of insect control, and other environmental factors affecting the growing and storing of farm products and the influence of environment on the health and production of farm animals as well as the housing of the farm family. Headquarters of the bureau are at the Plant Industry Station, which is part of the Agricultural Research Center. As the name of the bureau indicates, the investigations are along three main subject matter lines:

The research with plants is concerned chiefly with reducing the hazards of production and improving the yield and quality of all crops. One important phase is the introduction and testing of promising seeds and plants from foreign countries for possible domestic use and for genetic improvement of crops now grown, which in part has been the basis for recent record crops. The breeding of plants that will produce crops of high yield, good quality, and multiple resistance involves fundamental research in the laws of inheritance looking toward sound procedures, and study of the pathology, ecology, physiology, morphology, and cytology of the plants

themselves for an adequate understanding of disease control and the relations between environment and cultivation, and yield and quality.

The soil investigations center around relations between the soil and the crops it produces, and the research seeks to develop a better understanding of the various soils of the country and to find ways to increase their fertility and productivity, including systems of management that will conserve the resource. An important phase of the work is the soil survey, involving classification of the country's more than 8,000 soils by counties, now about half completed. Soil management studies carried out in the humid regions, in dry-land regions, and under irrigation involve many broad problems such as those associated with saline and alkaline conditions. The fertilizer investigations include study of qualities of various fertilizing materials and methods of analysis and the effects of various chemicals on yields and on other reactions of crop plants.

The engineering work has to do with the efficient use of power, labor, machines, and materials in farming. Studies are directed toward improving farm machinery and equipment for the many farm production operations, improving and developing methods of conditioning hay and grain, cotton ginning and packing, and processing of various other crops on the farm or in the nearby rural community. Research also is done on development of income-producing uses of electricity on the farm, including power, light, and other forms of electric radiation. Studies in farm structures aim to improve the design of farm storages and service buildings for efficient operation, strength, and economy in materials and construction while those in animal housing involve the environmental factors that may affect the health and production of the animals. Farm housing research of the bureau involves the design and planning of more livable farm homes.

9. What is the Bureau of Agricultural Economics?

The Bureau of Agricultural Economics is the primary economic research and statistical agency of the Department of Agriculture. At the same time, it is a staff and service agency. As a staff agency, it is responsible for coordination of social and economic research and of statistical work throughout the Department. The research work of BAE is centered in three major fields of investigation: Production economics, prices and marketing, and farm population.

Stated broadly, work in production economics is concerned with the effective use of human and natural resources in production. It includes research in (1) agricultural finance--covering farm mortgage credit, short-term credit, agricultural risks and insurance, farm taxation, local government and public finance, and farm construction; (2) farm management and costs--covering costs and returns, farm organization and management, production trends, interregional competition, utilization of labor, equipment, and farm practices; and (3) land economics--covering land values, land policy, land tenure, land utilization, and water utilization.

In the field of prices and marketing, research is concerned with some of the most important economic problems faced by farmers. This includes research in agricultural history; supply, demand, and price analysis for farm products as a whole and for individual commodities; income; food consumption; marketing margins and costs; the general economics of marketing; transportation of farm products; and consumer preferences.

In the field of farm population, research has to do primarily with farm people: how many there are, where they live, how many are in the farm work force, what their levels and standards of living are, and what are the factors that underlie their products and marketing intentions and behavior.

As a statistical agency, the Bureau of Agricultural Economics collects most of the primary agricultural statistics in the United States other than the Census of Agriculture taken every five years by the Department of Commerce, and the daily market statistics collected by the Production and Marketing Administration of the Department of Agriculture. The Crop Reporting Board is a part of the Bureau of Agricultural Economics, and supervises the work of State agricultural statisticians. It collects most of its primary statistics in cooperation with State departments of agriculture or, in some instances, land grant colleges. Through analyses of the primary data collected by its own employees and by other agencies, the research divisions of the Bureau of Agricultural Economics derive a great many secondary statistical series. Among these are farm income, food consumption, and price spreads between farmers and consumers.

One of the duties of the Bureau of Agricultural Economics as a staff agency is the coordination of economic research throughout the Department of Agriculture. Economic research is conducted in the Production and Marketing Administration, the Bureau of Human Nutrition and Home Economics (which is part of the Agricultural Research Administration), the Office of Foreign Agricultural Relations, the Farm Credit Administration, the Forest Service, and occasionally in other agencies.

As a staff agency, BAE is also responsible for coordinating the collection, analysis, and preparation for publication of statistics throughout the Department; and for acting as the Department's liaison with other agencies of the Federal Government in matters concerning statistics and economic research. It is responsible for reviewing and submitting to the Budget Bureau for approval all questionnaires going to the public from the Department of Agriculture for the collection of statistics. It also is responsible for approving all statements issued by any agency of the Department on national income, employment, or production. It is responsible for the work of the Outlook and Situation Board, consisting of specialists drawn from the Bureau and, where appropriate, from other agencies of the Department. That Board is responsible for the technical review and approval of all economic situation and outlook reports prepared within the Bureau or by other agencies of the Department. Another of its functions as a staff agency is to supply the Secretary's Office and other agencies of the Department with statistical data and economic analyses relating to current and proposed Department programs and activities.

10. What other Department agencies conduct research?

Research, in addition to that carried on by the Agricultural Research Administration and the Bureau of Agricultural Economics, is conducted by the Forest Service, the Soil Conservation Service, the Production and Marketing Administration, the Farm Credit Administration, and the Office of Foreign Agricultural Relations.

All the research in these five agencies is coordinated either by the Chief of the Bureau of Agricultural Economics or by the ARA Administrator. A considerable amount of this research is financed with funds appropriated under the Research and Marketing Act, which is under the direction of the

ARA Administrator. Through the use of the single project office and through frequent consultations and discussions, these two coordinating agencies encourage a dovetailing of the research in the physical and biological sciences with that in the social and economic sciences.

The Forest Service, in its forest and range experiment stations and in the Forest Products Laboratory at Madison, Wisconsin, conducts investigations in the entire field of forestry and wild land management, including the growth, protection, and harvesting of timber, management of range lands, efficient and economical utilization of forest products, and research in forest economics and taxation and forest influences. Forestry problems dealing with insect and disease control and with range grasses are handled cooperatively with the ARA bureaus responsible for those subjects. The Forest Service is also making a study of the Nation's present and potential forest resources.

The Soil Conservation Service conducts research to determine the character, causes, effects, and extent of soil and water loss and to develop, adapt, and improve conservation farming practices and methods which will adequately protect agricultural land and related water resources. The research includes investigations and studies dealing with the engineering aspects of irrigation and drainage and the management of land as related to water yield and control. Surveys are conducted and practices developed for the control of sediment in streams and reservoirs throughout the United States. The research is also designed to furnish information as a basis for flood control, supplemental to the channel control and impoundment work of the Army.

The Production and Marketing Administration conducts research in support of its primary responsibility for the formulation and administration of action and service marketing programs. This research includes related phases of marketing such as increasing efficiency of various marketing functions and reducing costs and margins, increasing outlets for farm and food commodities, maintaining quality of commodities in the marketing channels, insuring equitable pricing, and assisting in developing new marketing programs and evaluating or improving existing ones. The PMA is responsible for conducting research leading to the improvement of quality standards, market news, and regulatory programs, and for the development of improved mechanical equipment for use in grading and inspection services.

In connection with its programs on marketing agreements and orders, price supports, purchase contracts, surplus removal, storage operations, direct distribution, or other programs, the PMA may conduct specialized research, related to costs, margins, and demand-supply-price relationships, which is basic to sound administrative decisions. Research to improve the efficiency of marketing commodities includes analysis of factual information relating to marketing services; location, construction, and operation of various types of facilities; trade practices; containers; shipping and handling practices; merchandising methods; and trade barriers and effects of local and State laws on efficient distribution and movement of farm commodities across State lines. This research includes the marketing functions of assembling, transporting, packing, packaging, storing, processing, wholesaling, and retailing. The PMA uses the results of such research to analyze and evaluate the economies and efficiencies which would result from the adoption of new or improved marketing practices, facilities, or equipment by individual marketing firms under actual operating conditions.

The Farm Credit Administration conducts research and service activities relating to problems of management, organization policies, merchandising, sales, costs, competition, and membership arising in connection with the cooperative marketing of agricultural products and the cooperative purchase of farm supplies and services.

The Office of Foreign Agricultural Relations carries on two broad types of research having to do with foreign aspects of agriculture. One is in the field of foreign agricultural trade, policy, and production as they affect United States agriculture. The other concerns agricultural problems that are of mutual interest to the United States and the cooperating countries. An example of the first type is the gathering of information on foreign demand for and competition with our agricultural products. Such information--on crop production, livestock numbers, stocks, and agricultural trade abroad--is obtained through American foreign service officers and other sources. Commodity experts are also sent abroad to make special studies. Representative of the second type is the Department's program of technical collaboration with other countries. For the past 10 years this work has been concentrated in Latin America on the tropical and semitropical products that are grown there and imported in large quantity by the United States. This program is now being extended to an increasing number of Eastern Hemisphere countries.

11. What is the relationship of the Agricultural Research Center to the total research program of the Agricultural Research Administration? What type of research is carried on at the Center? How many people are employed there?

The Agricultural Research Center is a part of the Agricultural Research Administration and is operated by the Administrator's Office. It is located at Beltsville, Maryland, about 13 miles northeast of Washington, D. C. All the bureaus within the ARA do a part of their research there, and a few other Federal agencies use its facilities. The ARA employs about 2,300 persons at the Center.

From the standpoint of research coordination, the Center has an important relationship to the total research program of the ARA. It is possible to assemble in one place, for an attack on one problem, the experience and abilities of many different kinds of scientists. Another important advantage is in the cooperative relations with State experiment stations. In the fundamental breeding work, for example, new plants and animals are developed at the Center and then sent to stations in various parts of the country for further development or adaptation. Most of the research at the Center deals with problems of national interest, and much of it is basic or fundamental research, with the goal of accumulating scientific information that can be applied elsewhere in finding solutions to specific, practical problems.

The Center covers about 12,000 acres and includes 40 buildings which are equipped to meet specific research needs. It has 100 barns and storage buildings and 500 small-animal and poultry houses. About 3,000 experimental farm animals, 10,000 mature fowls, and 5,500 small laboratory animals are kept at the Center. There is an apiary for bees. In 31 greenhouses, 5 acres are under glass. On the Center's land are experimental pastures, ranges, orchards, gardens, fields for cultivated crops, timber stands, and soil-treatment plots.

12. How are new varieties of plants and animals developed through research of the Agricultural Research Administration distributed so as to benefit the farmers? What steps are taken to prevent their exploitation and sale at exorbitant prices?

Seeds of new varieties of plants developed by the Department are increased until a sufficient quantity is available to send out to the State experiment stations in the areas where the plants are adapted. The experiment stations in turn increase the seed still more until they have a quantity sufficient for furnishing supplies to crop improvement associations. These associations are made up of outstanding farmers in the State who are especially equipped to keep the seed pure and in proper condition. Association members build up commercial stocks of the seeds or plants and place them on the market for purchase by farmers and others. Generally, new varieties of crop plants are adapted to more than one State, in which case the foundation seeds are released to all appropriate States at the same time. Hence, when the seed reaches the commercial stage, it is available in a wide area and in the hands of a number of commercial producers. Crop improvement associations are so organized that prices are controlled to the extent that the commercial seed producers get a reasonable profit for the extra care and work needed to produce the foundation seed but not an exorbitant profit.

In some respects the process for getting improved animals into production on the farms is similar to that for crop plants. The Department develops a desirable strain of livestock or poultry and furnishes breeding stock or hatching eggs to the State experiment stations, where production is increased and the surplus breeding stock is sold to interested livestock breeders and producers. Such a long time is required to increase the number of animals in new strains for distribution to breeders that in recent years the Department has eliminated in some instances the intermediate step of releasing surplus stock to the experiment stations. We now sell some of the surplus directly to breeders and producers.

13. How do American farmers receive research results and put them into use so quickly?

The most important channel through which research findings reach the farmers is the Extension Service. The basis of the educational work of the Federal and State Extension Services is the continuous stream of popularly written publications from research workers in the Department and in the States, giving in simple and concise form the results of research. In addition, these findings reach every rural community in the United States through the Extension Service system of country agricultural agents and home demonstration workers, who provide on-the-ground information and counsel to farm people regarding farm problems and techniques.

The Department maintains close working relationships with city and farm papers and magazines and with radio and television stations. Through the Extension Service and the various media of mass communication we are constantly striving to narrow the gap between discovery and application.

Another important way in which research results are made known to and accepted by American farmers is through the Department's many field stations. Farmers in the surrounding areas watch the work at these stations with great interest. In many cases they are eager to try out the findings on their own farms--sometimes even before the station is ready to recommend them.

In addition, thousands of farmers, research workers, and others visit the Agricultural Research Center at Beltsville, Md., each year. This wide-awake, eager attitude of our progressive farmers is responsible in large part for the rapidity with which research results are adopted.

In recent years several pilot research farms have been established, where new techniques are tested within a complete farming system and modified as the need is shown. Farmers attend demonstrations at these pilot research farms and see findings of research applied on farms of the same general types as their own. Hence, they learn in advance how to adapt the findings to their own farm operations and the benefits to be derived.

14. Through what channels do the trade and the United States consumer benefit from research findings?

Results of agricultural research of interest and use to trade organizations are published in the trade papers and magazines. Trade groups keep in touch with our work through commodity advisory groups and the Agricultural Research Policy Committee. At each of our four Regional Research Laboratories, where the work is of direct interest to industry, a technically trained official is designated as liaison between the laboratory and industry. Department representatives often attend meetings of industry associations and discuss research results that would apply in their particular fields. Publications aimed specifically to the trade are made available by the Department. Frequently, when a piece of research has been completed and tested in a pilot plant, representatives of industry groups are invited to the laboratories to see the operation and to discuss the possibilities of commercial adaptation.

Consumers benefit either directly or indirectly from all agricultural research, since it deals with food, clothing, and shelter. Of course a great deal of our research is aimed directly at consumers. An example is marketing research to find out how to get agricultural food crops from the farm to the consumer in the best possible condition, both in nutritive value and appearance and at a reasonable cost. The research in nutrition and home economics is also largely of direct concern to consumers; as is the research on household insects, meat, dairy and poultry products, and rural housing and household equipment. Consumers become acquainted with research which benefits them in many ways. They read about it in city and farm papers and magazines, hear about it on the radio, see new products in the stores with identifying display advertising, and receive publications issued by the Department of Agriculture and the State experiment stations. People in rural areas become acquainted with much of our work through Extension Service workers.

15. Are agricultural research findings made available to foreign countries? If so, how?

Agricultural research findings of the United States are finding their way to the farthest corners of the world. When President Truman proposed the Point IV program of technical assistance to the world, he was in reality calling for an increase in what the Department of Agriculture has been doing for many years. An outstanding effort in the Department is being made by our Library. The Library is in charge of carrying out publication exchange programs with other countries--we send them our scientific and technical publications, with the understanding that they will send us theirs.

The Library at present is carrying on such an exchange with 123 countries. This means that throughout the world our U. S. Department of Agriculture publications are on file in libraries available for ready reference. The Department of State also aids in the exchange of information. Altogether there are about 70 American libraries maintained overseas where people can find out what's going on in the United States.

There are special programs of cooperation with foreign countries whereby our agricultural information is made available. In Latin America and in the Eastern Hemisphere, the Department of Agriculture, through its Office of Foreign Agricultural Relations, is cooperating in specific projects of agricultural improvement. Our research information is being made available to the countries participating in the program of the Economic Cooperation Administration through our cooperative relationships with that organization. The ARA has representatives on the United States delegation of the United Nations Food and Agriculture Organization, where many technical agricultural problems are discussed.

Another important way in which our research information reaches other countries is through foreign agricultural administrators, scientists, and students who visit our laboratories and field stations. This year, for example, we expect that as many as 4,000 foreign visitors will come to the United States primarily to find out more about our agriculture. A great number of them will be interested mainly in agricultural research, and the facilities of the Department, the land grant colleges, and the State experiment stations will be made available to them.

There is a vast amount of private and semiprivate endeavor in the dissemination of research information. Our farm magazines and scientific journals of agriculture are circulated throughout the world. Some of our State colleges and other educational institutions cooperate with foreign institutions on specific projects. Numerous international organizations in special fields of science offer international forums for the exchange of scientific information.

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